

Table 132d: x, y, z and p give z-next & 2PN=CRnext: Exponential Power of 2 + Butterfly Fractal1 + Mersenne Prime Squares

x, y, z and p give z-next & z gives x-next via: Exponential Power of 2 + Butterfly Fractal <sub>1</sub> + Mersenne Prime Squares																								
line #	$z_n = z \text{ next} = xz + y =$							ex p 2x	$z_n = z \text{ next} = xz + y = PN + y_n$															
	$2^n = x$	$2^n - 1 = y$	$2^{n-1}$	$(2^{n-1}) - 1 = z$	$xz = n \sum n$				variables: x,y,z	variables: x	variables: y	variables: z	MPS	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z	variables: x,y,z
	n	x	y = x - 1		z = x + y	xz	yz		xy					$z^2$										
n	$x = 2^{p-1} = 2^p/2$	$y = 2^{p-1} - 1 = (2^p-2)/2$		$z = Mp = 2^p - 1$	PN	OC	CR	p	PN + y	$2x^2 - 1$	$4y+3$	$2z+1$	$2(x^2+y^2)-1$	PN + y	$2PN + 2y + 1 = 2PN + z$	$4PN + 4y + 3$	$8PN + 8y + 7$	$16PN + 16y + 15$	$32PN + 32y + 31$	$64PN + 64y + 63$	$128PN + 128y + 127$	$256PN + 256y + 255$	$512PN + 512y + 511$	$1024PN + 1024y + 1023$
1	1	2	1	1	3	6	3	2	7	7	7	7	9	7	15	31	63	127	255	511	1023	2047	4095	8191
2	2	4	3	2	7	28	21	12	31	31	15	15	49	31	63	127	255	511	1023	2047	4095	8191	16383	32767
3	3	8	7	4	15	120	105	56	127	127	31	31	225	127	255	511	1023	2047	4095	8191	16383	32767	65535	131071
4	4	16	15	8	31	496	465	240	511	511	63	63	961	511	1023	2047	4095	8191	16383	32767	65535	131071	262143	524287
5	5	32	31	16	63	2016	1953	992	2047	2047	127	127	3969	2047	4095	8191	16383	32767	65535	131071	262143	524287	1048575	2097151
6	6	64	63	32	127	8128	8001	4032	8191	8191	255	255	16129	8191	16383	32767	65535	131071	262143	524287	1048575	2097151	4194303	8388607
7	7	128	127	64	255	32640	32385	16256	32767	32767	511	511	65025	32767	65535	131071	262143	524287	1048575	2097151	4194303	8388607	16777215	33554431
8	8	256	255	128	511	130816	130305	65280	131071	131071	1023	1023	261121	131071	262143	524287	1048575	2097151	4194303	8388607	16777215	33554431	67108863	134217727
9	9	512	511	256	1023	523776	522753	261632	524287	524287	2047	2047	1046529	524287	1048575	2097151	4194303	8388607	16777215	33554431	67108863	134217727	268435455	536870911
10	10	1024	1023	512	2047	2096128	2094081	1047552	2097151	2097151	4095	4095	4190209	2097151	4194303	8388607	16777215	33554431	67108863	134217727	268435455	536870911	1073741823	2147483647
11	11	2048	2047	1024	4095	8386560	8382465	4192256	8388607	8388607	8191	8191	16769025	8388607	16777215	33554431	67108863	134217727	268435455	536870911	1073741823	2147483647	4294967295	8589934591
12	12	4096	4095	2048	8191	33550336	33542145	16773120	33554431	33554431	16383	16383	67092481	33554431	67108863	134217727	268435455	536870911	1073741823	2147483647	4294967295	8589934591	17179869183	34359738367
13	13	8192	8191	4096	16383	134209536	134193153	67100672	134217727	134217727	32767	32767	268402689	134217727	268435455	536870911	1073741823	2147483647	4294967295	8589934591	17179869183	34359738367	68719476735	137438953471
14	14	16384	16383	8192	32767	536854528	536821761	268419072	536870911	536870911	65535	65535	1073676289	536870911	1073741823	2147483647	4294967295	8589934591	17179869183	34359738367	68719476735	137438953471	274877906943	549755813887
15	15	32768	32767	16384	65535	2147450880	2147385345	1073709056	2147483647	2147483647	131071	131071	4294836225	2147483647	4294967295	8589934591	17179869183	34359738367	68719476735	137438953471	274877906943	549755813887	1099511627775	2199023255551
16	16	65536	65535	32768	131071	8589869056	8589737985	4294901760	8589934591	8589934591	262143	262143	17179607041	8589934591	17179869183	34359738367	68719476735	137438953471	274877906943	549755813887	1099511627775	2199023255551	4398046511103	8796093022207
17	17	131072	131071	65536	262143	34359607296	34359345153	17179738112	34359738367	34359738367	524287	524287	68718952449	34359738367	68719476735	137438953471	274877906943	549755813887	1099511627775	2199023255551	4398046511103	8796093022207	17592186044415	35184372088831
18	18	262144	262143	131072	524287	137438691328	137438167041	68719214592	137438953471	137438953471	1048575	1048575	274876858369	137438953471	274877906943	549755813887	1099511627775	2199023255551	4398046511103	8796093022207	17592186044415	35184372088831	70368744177663	140737488355327
19	19	524288	524287	262144	1048575	549755289600	549754241025	27487382656	549755813887	549755813887	2097151	2097151	1099509530625	549755813887	1099511627775	2199023255551	4398046511103	8796093022207	17592186044415	35184372088831	70368744177663	140737488355327	281474976710655	562949953421311
20	20	1048576	1048575	524288	2097151	2199022206976	2199020109825	1099510579200	2199023255551	2199023255551	4194303	4194303	4398042316801	2199023255551	4398046511103	8796093022207	17592186044415	35184372088831	70368744177663	140737488355327	281474976710655	562949953421311	112589906842620	2251799813685250
21	21	2097152	2097151	1048576	4194303	8796090925056	8796086730753	4398044413952	8796093022207	8796093022207	8388607	8388607	17592177655809	8796093022207	17592186044415	35184372088831	70368744177663	140737488355327	281474976710655	562949953421311	112589906842620	2251799813685250	4503599627370500	9007199254740990
22	22	4194304	4194303	2097152	8388607	35184367894528	35184359505921	17592181850112	35184372088831	35184372088831	16777215	16777215	70368727400449	35184372088831	70368744177663	140737488355327	281474976710655	562949953421311	112589906842620	2251799813685250	4503599627370500	9007199254740990	18014398509482000	36028797018964000
23	23	8388608	8388607	4194304	16777215	140737479966720	140737463169505	70368735789056	140737488355327	140737488355327	33554431	33554431	281474943156225	140737488355327	281474976710655	562949953421311	112589906842620	2251799813685250	4503599627370500	9007199254740990	18014398509482000	36028797018964000	72057594037927900	144115188075856000
24	24	16777216	16777215	8388608	33554431	562949936644096	56294993089665	281474959933440	562949953421311	562949953421311	67108863	67108863	112589839733761	562949953421311	112589906842620	2251799813685250	4503599627370500	9007199254740990	18014398509482000	36028797018964000	72057594037927900	144115188075856000	288230376151712000	576460752303423000
25	25	33554432	33554431	16777216	67108863	2251799780130816	2251799713021953	1125899873288192	2251799813685250	2251799813685250	134217727	134217727	4503599493152769	2251799813685250	4503599627370500	9007199254740990	18014398509482000	36028797018964000	72057594037927900	144115188075856000	288230376151712000	576460752303423000	115292150460685000	230584300921369000
26	26	67108864	67108863	33554432	134217727	9007199187632128	9007199053414401	4503599560261632	9007199254740990	9007199254740990	268435455	268435455	18014398241046529	9007199254740990	18014398509482000	36028797018964000	72057594037927900	144115188075856000	288230376151712000	576460752303423000	115292150460685000	230584300921369000	461168601842739000	922337203685477000
27	27	134217728	134217727	67108864	268435455	3602879688474240	36028796616310785	18014398375264256	3602879701896400	3602879701896400	536870911	536870911	72057593501057025	3602879701896400	72057594037927900	144115188075856000	288230376151712000	576460752303423000	115292150460685000	230584300921369000	461168601842739000	922337203685477000	18589934591	37179869183
28	28	268435456	268435455	134217728	536870911	144115198607420416	144115187270549505	72057593769492480	1441151880758560	1441151880758560	1073741823	1073741823	288230375077969921	144115188075856000	288230376151712000	576460752303423000	115292150460685000	230584300921369000	461168601842739000	922337203685477000	18589934591	37179869183	74379869183	14875813887
29	29	536870912	536870911	268435456	1073741823	576460751766552576	576460750692810753	288230375614840832	5764607523034230	5764607523034230	2147483647	2147483647	4611686014132420609	576460752303423000	115292150460685000	230584300921369000	461168601842739000	922337203685477000	18589934591	37179869183	74379869183	14875813887	2975813887	5951627775
30	30	1073741824	1073741823	536870912	2147483647	2305843008139952128	230584300596246881	115292150353105152	2305843009213690	2305843009213690	4294967295	4294967295	18589934591	230584300921369000	461168601842739000	922337203685477000	18589934591	37179869183	74379869183	14875813887	2975813887	5951627775	11911627775	238230376151712000
31	31	2147483648	2147483647	1073741824	4294967295	9223372034707290000	9223372030412320000	4611686016279000000	9223372036854770	9223372036854770	8589934591	8589934591	17179869183	922337203685477000	18589934591	37179869183	74379869183	14875813887	2975813887	5951627775	11911627775	238230376151712000	47679869183	95359738367

Table 132d: x, y, z and p give z-next & 2PN=CRnext: Exponential Power of 2 + Butterfly Fractal<sub>1</sub> + Mersenne Prime Squares The next "z" values — shown after the "p" Column — are derived from the values in the Columns before the "p" Column. Computer rounds out. 4y+3 and 2z+1, feeding directly off of the Column values to the far left, generate double the number of container-Mersenne Prime values as compared to the other. The RED Columns—with gradient highlights—shows that taking EVEN multiples of PN and adding n "y" values — where n= 2<sup>n</sup> + 2<sup>n-1</sup> -1— gives the z-next values. Remember that y=x-1=z-x= (Mp-1)/2. While "y" is ALWAYS +3 and Mp (>3) is NOT, they share intimate connections, as "y" reveals the "containers" between the z-values. If z+1=x-next and x-1=y, then it appears that y=z, as x-next -1=z. What we are seeing is how the simple doubling of numbers (quantities) seen in the Exponential Power of 2 series — forming the Butterfly Fractal 1 — and their running sums, often with ±1, give rise to the individual parameters of x, y, z, (and p) values having similar, intimate and repeating values. It is the result of the fractals at work! We are also seeing how multiples of 1 parameter — PN+y<sub>n</sub> — gives the same z-next pattern, with only the starting point being different.